

ELEMENTIS

SPECIALTIES

THIXCIN[®]R

Questions & Answers





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Q: What is THIXCIN[®] R?

A: THIXCIN[®] R is a rheological additive. It is an organic derivative of castor oil and comes in the form of a fine powder.

The INCI name for THIXCIN[®] R is trihydroxystearin.

THIXCIN[®] R is obtained by hydrogenating castor oil. Micronisation of the hydrogenated castor oil produces a product with a particle size of less than 44 microns.



THIXCIN[®] R has a melting point of 85-88°C.

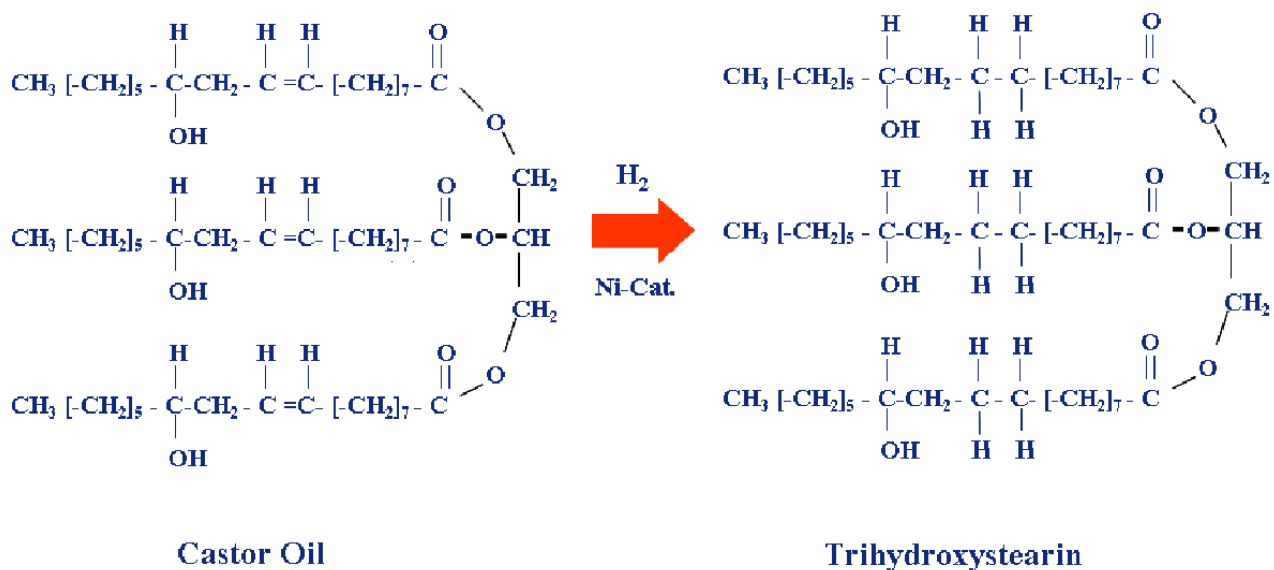


Figure 1. Hydrogenation reaction of castor oil to produce trihydroxystearin.

Q: Where can THIXCIN® R be used and what major benefits can be achieved?

A: THIXCIN® R is suitable for various cosmetic and personal care formulations, including colour cosmetics, skin care, sun care and hair care. Product forms can be emulsions, oil gels, sticks and powders, etc.

As an effective rheological additive, THIXCIN® R builds viscosity, suspends particulates, offers a high degree of thixotropy and helps control flow.

It can greatly enhance the physical stability of formulations, in either emulsions or single oil phase formulations.

In solid product forms, such as lipsticks or hair styling sticks, it also functions as a stiffening agent. Additional benefits may include improved pay-off, added lubricity and a buttery feel.

In body wash formulations THIXCIN® R proved to be an effective rheological modifier and can be used to achieve the desired “false body” effect.

Its water repellency is very useful in products such as lipgloss and lipstick, etc.

THIXCIN® R can also be used as a dry binder in pressed powders.

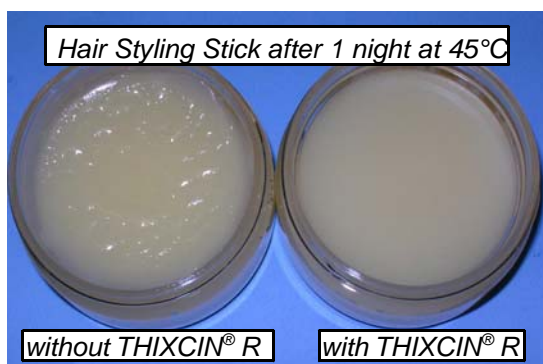


Figure 2. Hair Styling Stick with and without THIXCIN® R. THIXCIN® R eliminates sweating on the stick surface when stored overnight at 45°C.



Figure 3. Baby Cream with and without THIXCIN® R. THIXCIN® R dramatically improves the stability of the product.

Q: What is the preferred procedure for dispersing and activating THIXCIN® R?

A: Unless limited by specific formulation requirements, the following incorporation procedure is generally suggested for optimal activation of THIXCIN® R:

1. Disperse THIXCIN® R powder with stirring into the whole, or part, of the oil phase at room temperature, or at 55-60°C.
2. Heat the THIXCIN® R and oil mixture to 55-60°C, if mixed at room temperature.
3. Apply high shear mixing for about 20 minutes while maintaining the temperature at 55-60°C to allow full activation.
4. Cool to below 35°C with low to medium shear stirring.

This process is further illustrated in Figure 4.

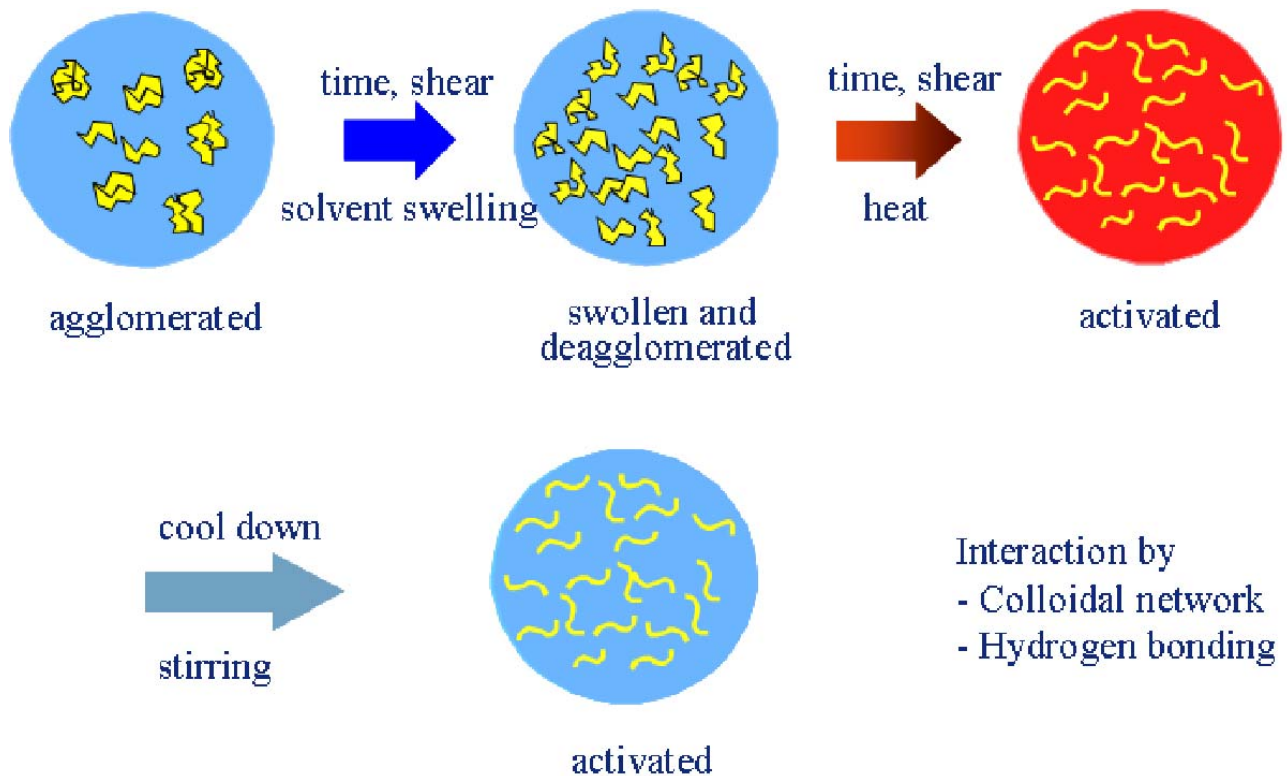


Figure 4. Processing THIXCIN® R.



Q: What mixing equipment is suggested?

A: During the 20 minute period of shear, a silverson homogeniser, high shear stirrer or another similar type of mixing equipment may be used. Propeller stirring is recommended during the cooling process.

Q: Is it possible to formulate THIXCIN® R into my system with varied processing conditions?

A: Although the suggested incorporation procedure proved to be satisfactory in most systems, other processing conditions may be needed, depending on the requirements of the formulation.

In addition, for the convenience of formulation, optional ways to incorporate THIXCIN® R may also be required. We studied the processing of THIXCIN® R in a series of single solvent systems, as well as personal care formulations, and found that it is possible to activate THIXCIN® R under varied conditions. The results depend on the solvent system and the formulation, and should be evaluated case by case.

One major indicator of unsuccessful incorporation of THIXCIN® R is the seeding phenomenon.

More details about this will be covered in the answers to the next few questions.



Q: What is seeding?

A: Seeding is a crystallization effect. We can usually detect whether seeding occurs or not by visual inspection of the formulation. Seeding appears like soft gel particles. In formulations it may lead to the appearance of a grainy texture, but these particles are soft to the touch. Although seeding is not desired, due to the negative impact on appearance, the presence of seeding does not have a major impact on the thixotropic properties. To help describe the seeding phenomenon, we took pictures of formulations with and without seeding under a microscope. These are shown in Figures 5 and 6.



Figure 5. Product with THIXCIN® R, without seeding. Figure 6. Product with THIXCIN® R, showing seeding.

Seeding is normally caused by excessively heating above the recommended activation temperature, as illustrated in Figure 7. Under excessive heat, THIXCIN® R is dissolved into the solvent system, which, upon cool-down, may separate out of the solution as soft crystals or seeds. Whether seeding occurs, due to exposure of THIXCIN® R to higher temperatures, e.g. 85°C, is largely dependent on the particular oil/solvent system. Alternatively, if the activation temperatures are too low, seeding may also be observed, since proper activation of THIXCIN® R cannot occur. As shown in Figure 7, lower than required processing temperatures means that the rheological development is stopped in stage 2. In this case the swollen particles will remain visible after cooling down. Although seeding is usually caused during the processing stages, seeding normally only becomes visible after processing, when the system has been cooled down.

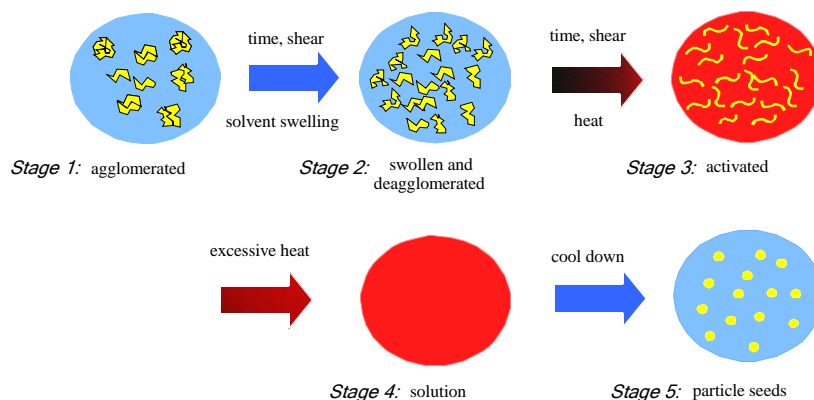


Figure 7. Processing of THIXCIN® R, which can lead to seeding.

Q: What possible ways are there to incorporate THIXCIN[®] R into different systems without the undesirable "seeding" phenomenon?

A: Ideally, we suggest to follow the preferred incorporation procedure outlined earlier, which ensures optimal activation without seeding. In the product formulation process, a master batch can be prepared containing a higher level of THIXCIN[®] R, e.g. 10%, dispersed in a suitable liquid using high shear mixing equipment. This can then be

incorporated into the rest of the formulation with ordinary mixing, without the need of additional high shear. As indicated earlier, if the overall formulation process does not allow us to follow the preferred THIXCIN[®] R incorporation method, it may still be possible to activate THIXCIN[®] R using varied processing conditions without causing seeding. We know that whether seeding occurs, due to THIXCIN[®] R exposure to higher temperatures, such as 85°C, is largely dependent on the particular oil/solvent system. Figure 8 shows an example where seeding depends more

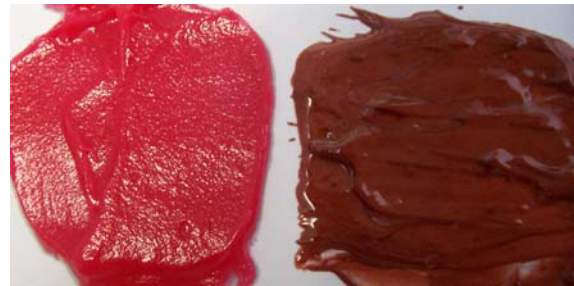


Figure 8. Two lipgloss formulations containing the same level of THIXCIN[®] R were heated to 85°C, mixed and then cooled without stirring. The formulation on the left shows seeding, whereas the formulation on the right shows no seeding.

on the solubility of THIXCIN[®] R in a particular blend of oils, than the heating temperatures. If THIXCIN[®] R is heated to 85°C accidentally, or due to formulation requirements, and seeding is observed in the formulation, the seeds can be eliminated by bringing the batch to the recommended temperature and applying high shear for 20 minutes. When making a typical emulsion, THIXCIN[®] R may have to be added to the oil phase and heated to a higher temperature to form the emulsion. During the cool-down process, maintaining the temperature at 55-60°C for 20 minutes, while applying high shear, may help reduce the risk of seeding. The formulation can be cooled to room temperature with stirring. In a single oil phase formulation, higher temperatures may be needed to melt certain ingredients within the formulation. THIXCIN[®] R can be added and activated during the cool-down process by maintaining 55-60°C for 20 minutes, while applying high shear mixing to reduce the chance of seeding. For a stick formulation, the formula may solidify above or around 55-60°C. In this case, THIXCIN[®] R may be successfully incorporated even at higher temperatures without seeding, but this largely depends on the system. In cases where seeding is observed, due to low activation temperatures, correction can be made by bringing the batch to 55-60°C, while applying high shear for 20 minutes.

Q: Can I thicken Cyclomethicone using THIXCIN® R?



A: Formulations containing Cyclomethicone and materials in the organic phase can be thickened using THIXCIN® R. However, it is difficult to thicken Cyclomethicone alone using THIXCIN® R. Even processed at 55°C, we could not successfully activate THIXCIN® R in Cyclomethicone alone to achieve a thickening effect.

The recommended procedure for adding THIXCIN® R to a formulation containing Cyclomethicone is either to activate the THIXCIN® R in another solvent within the formulation, and then add the Cyclomethicone to this, or to activate the THIXCIN® R in the entire solvent blend of the formulation, which includes the Cyclomethicone.

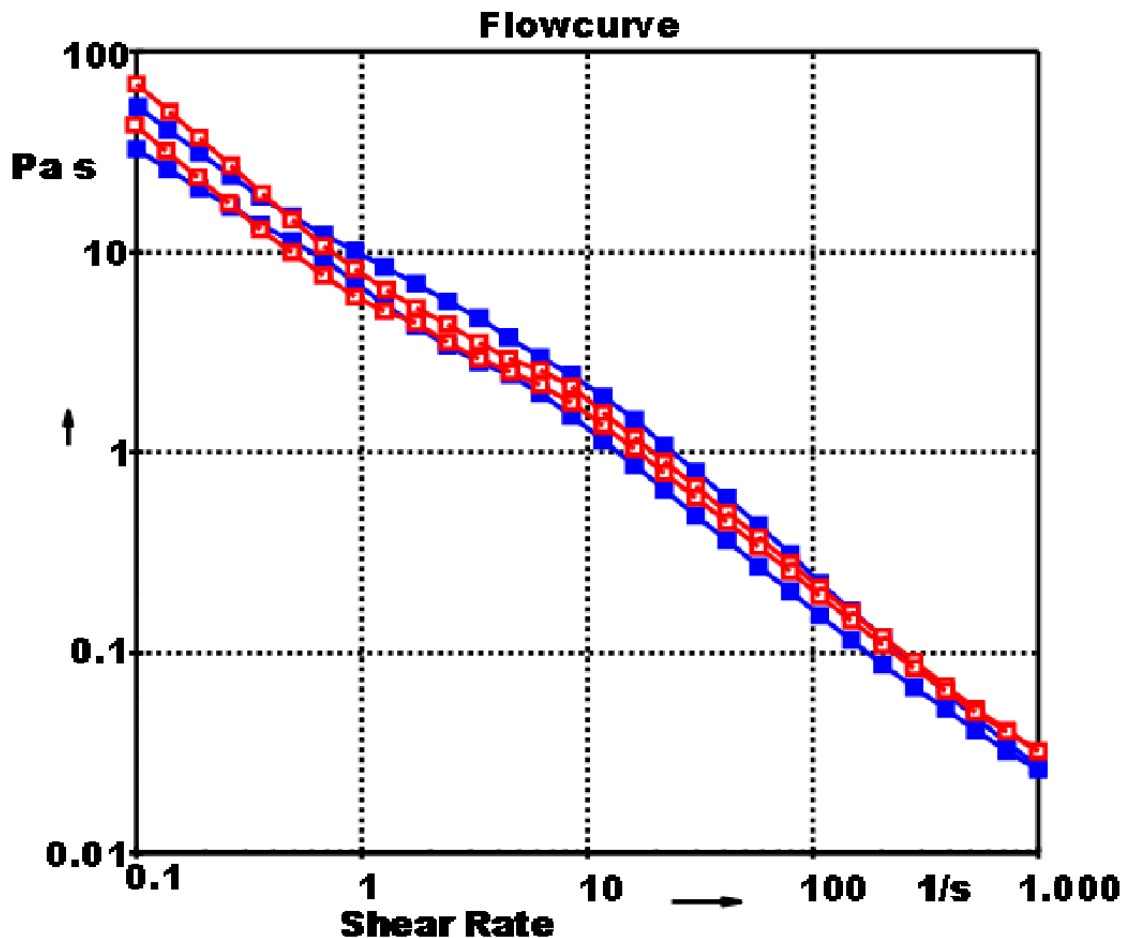
Particular care has to be taken when thickening samples containing Cyclomethicone with THIXCIN® R, as they can be prone to seeding.

The thickening performance of THIXCIN® R in formulations containing Cyclomethicone, and the probability that seeding occurs, is completely dependant on the entire solvent blend.

Q: Does it matter if the recommended mixing time has to be extended?

A: The mixing time for activating THIXCIN® R can be extended beyond the recommended 20 minutes without any negative impact. This is demonstrated in our test results shown in figure 9, where the mixing time was extended for up to 2 hours.

However, mixing times of less than the recommended 20 minutes could cause improper activation.



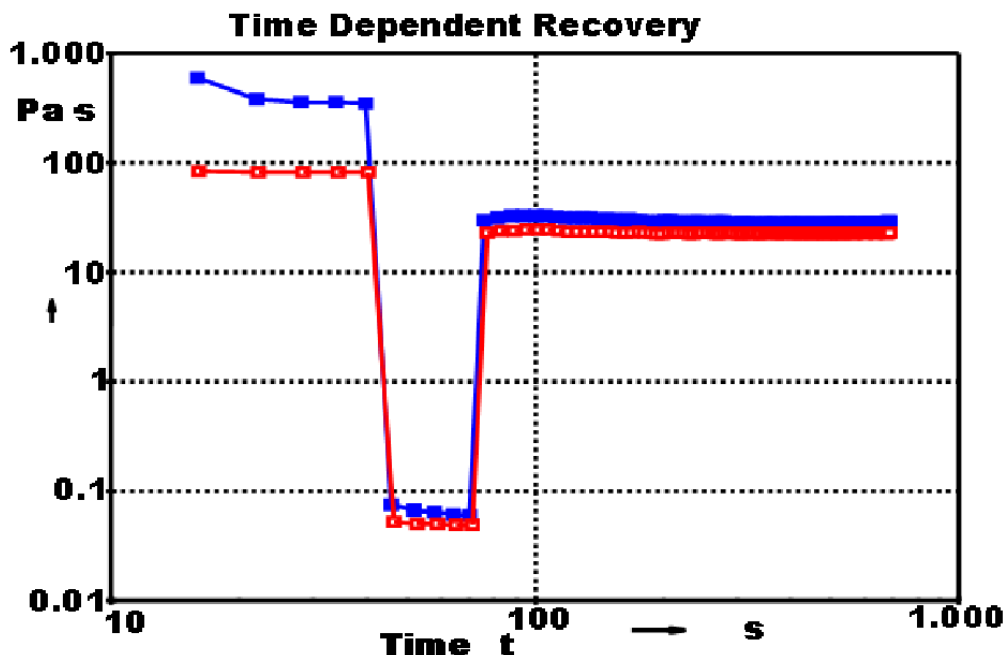
- 5% THIXCIN® R in Isopropyl Myristate stirring on cooling (55°C)
- 5% THIXCIN® R in Isopropyl Myristate mixed for 2 hours stirred on cooling (55°C)

Figure 9. Flow curve showing 5% THIXCIN® R in Isopropyl Myristate, activated at 55°C, and stirred on cooling. Results for 20 minutes high shear mixing and 2 hours high shear mixing are similar, with no negative impact observed.

Q: What is the "false body" effect and how do I achieve this unique effect in my formulations?



A: False Body is an effect achieved when the product is packed at elevated temperatures without using shear in the cool down process. This gives a product with a higher apparent viscosity, known as "false body". The false body effect can be lost irreversibly when shear is applied to the product. Figure 10 shows how the higher apparent viscosity is lost under shear and returned to the same viscosity as that usually obtained by cooling down with shear. The interesting false body effect has been applied in body wash formulations for easy application. A thick product, due to the higher apparent viscosity, allows for controlled dispensing from the container. During product usage, the false body effect is lost due to shear and a much thinner product is achieved, which allows for easy use. In stick formulations, this effect can help create a stable and stiff product, while offering good pay-off and a smooth finish.



- 5% THIXCIN® R in C12-15 Alkyl Benzoate no stirring on cooling (55°C)
- 5% THIXCIN® R in C12-15 Alkyl Benzoate stirring on cooling (55°C)

Figure 10. Time Dependent Recovery Curve. The first interval shows the performance of the products under low shear. The product which underwent cooling without shear has a higher viscosity than the product cooled with shear. In the second interval high shear is applied to the products. In the third interval the products are subjected to a second phase of low shear. Here we see that both products now have the same viscosity. The sample which was not stirred on cooling has lost its original higher viscosity, and now performs the same as the product stirred on cooling.

Q: What is the benefit of using THIXCIN[®] R in combination with BENTONE GEL[®] in my formulation?

A: The combination of THIXCIN[®] R and BENTONE GEL[®] can further enhance the formulation stability, especially in cases where the use of each alone did not give satisfactory results in eliminating phase separation and thermostability issues. The combination can reduce oil separation effectively in a hard to stabilize single oil phase formulation, as demonstrated in Figure 11. In emulsion systems, the combined usage also provides an effective solution for physical stability issues, in many cases.

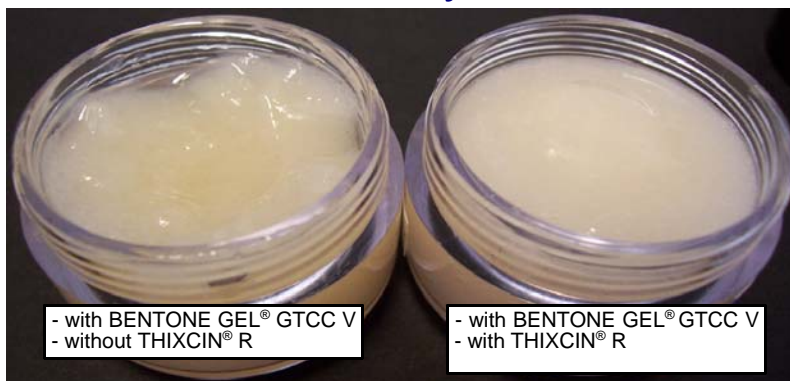


Figure 11. Single oil phase product containing a high level of BENTONE GEL[®] GTCC V, with and without THIXCIN[®] R. The product without THIXCIN[®] R gave phase separation, whereas the formulation with THIXCIN[®] R, gave an extremely smooth surface texture and optimum stability.

Q: What is the recommended procedure when both THIXCIN[®] R and BENTONE GEL[®] are incorporated into the same formulation?

A: Two procedures may be considered:

Procedure 1

- First activate THIXCIN[®] R in oil/solvent by applying high shear mixing at 55-60°C for 20 minutes.
- Add BENTONE GEL[®] into the batch and mix until uniform.
- Cool the system down, with or without shear.

Procedure 2

- First incorporate an appropriate BENTONE GEL[®] into the oil/solvent with medium to high shear mixing.
- Add THIXCIN[®] R to the batch with high shear mixing at 55-60°C for 20 minutes.
- Cool the system down, with or without shear.

Q: Can you show me a few examples of using THIXCIN® R in some common personal care formulations?

A: THIXCIN® R can be incorporated into most types of products offering benefits, such as, stiffening in lipsticks, phase stability improvement in creams, lotions, shampoos and body washes, increased lubricity, improved pay-off in stick formulations, increased temperature stability, and reduction of oil migration. Below are some examples of possible formulations, where THIXCIN® R could be used. These include use as a binder in pressed powder formulations, or in sticks to help with the aesthetics and pay-off properties, or in emulsions, to help prevent phase separation and flow characteristics.

As previously mentioned, THIXCIN® R can also be used to improve skin feel properties, by imparting a smooth buttery feel.



Figure 12. W/O urea cream. Addition of 0.4% THIXCIN® R eliminated all phase separation and gave optimal storage stability performance.

Figure 13. Cream containing 0.2% THIXCIN® R. The addition of THIXCIN® R eliminated phase separation after 7 freeze/thaw cycles, improved thermostability and enhanced viscosity and thixotropy.

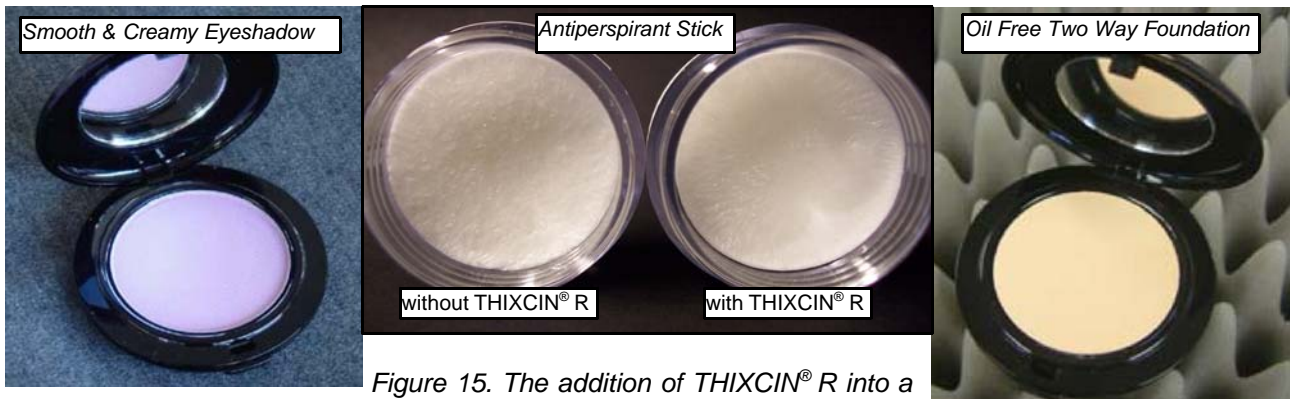


Figure 14. Smooth & creamy eyeshadow containing THIXCIN® R as a binder.

Figure 15. The addition of THIXCIN® R into a 24 hour antiperspirant deodorant stick formulation imparted a smoother surface appearance and better pay-off properties.

Figure 16. Oil free two way foundation containing THIXCIN® R as a binder.



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